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ABSTRACT

An Eastern Michigan University course in Spanish for special purposes with an emphasis on technology was intended to serve students of business, international trade, and technology, but the actual enrollment came largely from the department of foreign languages and bilingual studies. However, significant diversity in scientific preparation and aptitude and in language proficiency was still found in the course population, both undergraduate and graduate. The courses have since been designed for a broad target group, with emphasis placed on translation from Spanish to English and limited English-to-Spanish translation practice. The course content includes fundamental technological and scientific terminology in a variety of fields (mathematics, physics and subfields, chemistry, biology, and automotive and computer technology). The methodology used involves extensive readings, vocabulary review, translation, oral reports, and examinations. Instructional materials at varying linguistic levels and from a variety of fields are used. Student evaluations of the course have indicated satisfaction with the amount of learning in varied fields and with their newly acquired ability to translate technical texts. Student dissatisfaction relates to learning vocabulary in fields unrelated to career goals, text difficulty, and the instructor's lack of technical knowledge in some fields. Course outlines are appended. (MSE)

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TEACHING SPANISH FOR TECHNICAL PURPOSES

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TEACHING SPANISH FOR TECHNICAL PURPOSES

In 1984 and 1985, Eastern Michigan University has received funding from the U.S. Department of Education to develop and implement a comprehensive program in International Studies and Foreign Languages with a focus on high technology. While several components are involved in this program, the one I will report on today is the Spanish language component, which includes a two semester sequence on the undergraduate level and a similar sequence on the graduate level for students who have not previously studied such material. I will describe the problems and successes in developing and offering the undergraduate courses over the last two years.

In our initial efforts to design the course, we attempted to follow a rather standard procedure of identifying the target populations, assessing their needs, and structuring course content in response to the identified needs and interests of our students.(1) We had anticipated that a significant part of the students would come from EMU's growing College of Technology as well as from majors in the College of Business and our departmental majors in Language and International Trade. To date, we have not been able to recruit any students from the College of Technology. We attribute this to the difficulty those students encounter in finding the time for language study within an already crowded curriculum. As a result, students during the first year of program implementation came almost exclusively from majors

offered by the Department of Foreign Languages and Bilingual Studies (14 out of 15). This of course meant that the general level of scientific and technical expertise was generally lower than originally anticipated. On the other hand, it also meant that the general level of language proficiency was higher than that anticipated for students in the College of Technology.

Despite the lack of students from the College of Technology, the student population still presented significant differences with respect to two key variables: 1. large disparities in technical and scientific preparation and aptitude, and 2. a wider than normal range of language proficiency, with a sizeable portion of the students, at least at EMU, having excellent language skills. This was particularly noticeable because these courses present topics of interest to native speakers interested in building their vocabulary for use in translating technical documents. Several of our students (2 of 7 in the first semester, 8 of 10 in the second semester) were Hispanics with native or near-native language proficiency. Their scientific and technical background, however, varied even more widely than those of non-native speakers. Our Hispanic population included a medical laboratory technician, a computer science major, and a professional translator.

Our experience illustrates a fundamental problem which Widdowson has addressed at length.(2) Teaching language for special purposes forces the course designer to examine the extent to which he or she believes such courses should emphasize precisely specified, restricted vocabulary and formulae for use in a limit-

ed range of problem situations. If we are successful in the future in identifying a specific subpopulation from the College of Technology or from a particular scientific background, we will be able to bias the course more heavily in this direction, following more closely the models developed in many English for Special Purposes (ESP) courses. Our first year of implementation, however, indicates that in our setting a broader approach is more suitable and more effective in stimulating student interest. Since most of our students did not have a specific scientific or technical field to target, they were receptive to a wide spectrum approach which provided an introduction to several different fields.

As a result of all the variables in student characteristics and interests, the courses have been designed and implemented in such a way as to serve a broad target group: anyone who (a) has the ability to participate in a class conducted primarily in Spanish (at least two, and preferibly three, years of college Spanish), and (b) needs bilingual skills in a technical or scientific field, whether for reading and translating documents to and from Spanish or for communicating with Spanish-speaking personnel in a work setting. Major emphasis is placed on translations from Spanish into English, but limited practice in English to Spanish translation is also included. Incidentally, the diverse nature of the student population also obliges the instructor to be extremely humble: it is almost certain that someone in the class knows more about the specific scientific or technical topic being covered than the instructor does.

Course content. We cover some of the fundamental terminolo-

gy in a wide variety of fields over the course of the two semester sequence (see Table 1). After introducing appropriate terms related to mathematics and measurement, we move to several subfields of physics, with an emphasis on those topics (electromagnetism, mechanics) which serve as a basis for the technical applications studied later on. In the first semester, we emphasize the automotive field, obviously of great relevance in southeastern Michigan. In the second semester, we move to the scientific fields of chemistry and biology, exploring applications in the areas of nutrition, laboratory techniques, and medical technology. We then address computer hardware and software, information systems, and automated processes. In addition to preparing the topics covered by the entire class, students are required to investigate the vocabulary and resources normally used in their particular scientific or technical fields of interest and to make reports on their findings to the class. These reports (two per semester) frequently introduce concepts and terminology from applications and fields not covered by the class as a whole.

Methodology. We sought to increase face validity and student interest by following Widdowson's admonition to use a "methodology which engages the learner in activities which he would normally engage in when putting language to use for particular purposes."(3) Our investigations of the practical needs of our students have indicated translation and a greater technical vocabulary are required. Therefore, students were given extensive readings in the fields to be covered in the semester. These readings were discussed and their technical vocabulary reviewed

in class. Based on the readings, lists of key vocabulary items have been constructed, and students are responsible for these items on periodic quizzes and examinations. Each week, students translate passages of approximately two hundred words, generally from Spanish into English, but two or three times per semester, from English into Spanish. Twice per semester, students make oral reports to the class in Spanish on scientific/technical topics of interest to them. They must distribute an outline of the report and a list of 12-15 technical vocabulary words included in the report. Examinations do not require detailed knowledge of the more esoteric tecnicalities introduced in the readings and class reports; they do require (a) the production of translations into English (or definitions in Spanish) of isolated terms and (b) translations of continuous passages relating to the topics covered. As can be seen from the above, the emphasis clearly falls on vocabulary acquisition and the translation skills needed to transfer technical knowledge from one language to the other.

Materials. Given the lack of a specific technical field to target, accomodating the varied student backgrounds and interests necessitates identifying materials at different levels of linguistic complication for many different fields and subspecialties. Grading the materials for both grammatical and notional (scientific/technical) content was a significant challenge.(4) As indicated before, because of the population at EMU this first year of implementation, we were able to use materials requiring a high level of language proficiency, but the subject matter sophistication was less than originally anticipated. As a result,

we have used a very broad array of sources, ranging from elementary school level introductions to gears, levers, and the inclined plane (developed for bilingual programs in the U.S.), to newspaper articles, to excerpts from Mexican secondary school science texts, to technical journal articles on telecommunication systems. We also used some materials with a comic book format designed to disseminate nutritional information to a wide audience (these were a welcome change in register for the Hispanics, but quite difficult for non-natives because of their informal idioms). This diversity of materials insures that there will be something both accessible and challenging to the students involved, whatever their background may be. It also generates more interest and variety than the standard textbook approach. Further diversity is introduced by student projects which go beyond the common class materials and frequently include realia from their specific fields.

Outcomes. Student evaluations reveal great satisfaction with the opportunities to investigate topics of interest to them. They also learn a surprising amount of new information in technical fields outside their original areas of expertise. Most students welcome this, provided that they are assured of the opportunity to focus on their specific interests both as a segment of the class and in their individual projects. Further, considerable satisfaction is derived from their awareness of increased skills in the translation of technical texts. Student dissatisfactions relate to having to study topics of little perceived relevance to their career goals, to the difficulty in

understanding some of the texts (and to the quality of the translations into Spanish of some texts based on English originals), and to the instructor's ignorance in certain technical fields.

TABLE 1

COURSE OUTLINES

SPN 456 Scientific and Technical Spanish I

Terminology, readings, and translation exercises in:

I. Mathematics
   - A. Arithmetic
   - B. Algebra
   - C. Plane geometry

II. Measurement
   - A. U.S. system
   - B. Metric system
   - C. Scientific units
     1. Mechanics
     2. Electricity and Magnetism

III. Electricity and Magnetism
   - A. Magnetism
   - B. Electricity
   - C. Electromagnetism
     1. Generators and alternators
     2. Motors
     3. Transformers

IV. Physics
   - A. Mechanics
     1. Pulley
     2. Gears
   - B. Heat
   - C. Sound
   - D. Electromagnetic spectrum

V. Internal Combustion Engine
   - A. Reciprocating
     1. Four cycle
     2. Two cycle
   - B. Rotary
   - C. Fuel system
   - D. Ignition system
   - E. Exhaust system

VI. Automobile
   - A. Drive train
   - B. Steering system
   - C. Braking system
   - D. Frame, body, and suspension system

VII. Student projects in areas of individual interest

SPN 457 Scientific and Technical Spanish II

Terminology, readings, and translation exercises in:

I. Chemistry
   - A. Periodic table
   - B. Compounds
   - C. Reactions

II. Biology
    A. Organic compounds
    B. Animals
    C. Human physiology
    D. Nutrition
    E. Medical technology
III. Computers
    A. Hardware
        1. Major components
        2. Peripherals
        3. Communications
    B. Software
        1. Binary code
        2. Programming languages
        3. Word processing
        4. Data bases
IV. Information systems
    A. Systems approach
    B. Design
    C. Data processing
    D. Telecommunications
V. Automation
    A. Feedback and communication systems
    B. Control systems
VII. Student projects in areas of individual interest

NOTES

1. Roger T. Bell, An Introduction to Applied Linguistics (New York: St. Martin's Press, 1981), pp. 32-52.

2. H. G. Widdowson, Learning Purpose and Language Use (London: Oxford University Press, 1983), pp. 5-28.

3. Widdowson, op. cit., p. 88.

4. Bell, op. cit., pp. 57-61.